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upon such an observer are very severe because the apparatus is extensive and complicated, and skilled and constant care must be devoted to the observations. Such services usually begin to be satisfactory about two months after the start is made, and their value increases through many years. The salary of such an assistant should be \$1,000 for the first year and there should be an increase of \$100 each year until \$1,500 is reached.

An unexpected result was that in nearly every case, the principal need proved to be for assistants. Some preferred one experienced observer, others two computers. In some cases, it is believed that if the work were once started it would be continued by the university. An astronomer can often direct one or two assistants so that they will obtain as accurate results as if he devoted the same time to the work himself. A small appropriation may thus double the output of his observatory.

My own application is included since I believe that as important results can be obtained here as elsewhere, but if all can not be provided for, I recommend that other astronomers having fewer assistants should receive precedence. Even if only a portion of the sum asked for could be provided, it is probable that an extraordinary relative output would be obtained. It is hoped that, in some cases, those interested in a particular observatory may be willing to supply its needs.

EDWARD C. PICKERING

December 21, 1914

#### FRANCIS HUMPHREYS STORER

FRANCIS HUMPHREYS STORER, of the Massachusetts Institute of Technology and later of the Bussey Institution of Harvard University, was born March 27, 1832, and died July 30, 1914. His father was David Humphreys Storer (M.D., LL.D.) and his mother was Abby Jane (Brewer) Storer. He married Catherine A. Eliot, sister of Charles W. Eliot, June 21, 1871.

Professor Storer studied at the Lawrence Scientific School in 1850-51. He was assistant to Professor Cooke in 1853. He received

from Harvard University the degree of S.B. in 1855 and the honorary degree of A.M. in 1870. From 1855 to 1857 he studied abroad and from 1857 to 1865 he practised as a chemist.

The writer knew him intimately from 1865 to 1870 when he was professor of general and industrial chemistry in the Massachusetts Institute of Technology and the writer was his pupil. In that year he resigned his position to become professor of agricultural chemistry in the Bussey Institution; the next year he became dean, an office which he held until he withdrew in 1907.

Professor Storer's pupils say of him that he was the best of teachers of chemistry. He and Professor Eliot were the pioneers in introducing the experimental method of giving instruction to classes in chemistry, and those who were ripe for it found in it the greatest inspiration. He was uniformly genial and had a great faculty of imparting his knowledge that was thoroughly interesting to his students. He possessed one of the most fascinating personalities of our day. Professor Rogers and Professor Storer were the two most inspiring teachers we had in the early days of Technology. Many of the pupils owe their absorbing interest in science to these two strong characters. In those days there were members of the faculty who were in favor of letting the students obtain the degree too easily; Storer was foremost in opposing this laxity, and insisted on the highest possible standard. He was a thorough teacher and a gentleman of high culture. He had a human side too, which endeared him to his pupils. On one occasion when an expedition was arranged to visit the coal mine in Rhode Island, all the party had arrived at the train and were excited and anxious because Eli Forbes had not turned up. At the last minute he appeared and stepped aboard as the train started and Storer remarked "and here is Eli the most prompt of us all."

All agree that his loss to Technology in 1870 was a severe one to that school.

Of his connection with the Bussey Institution it may be said he was always very ready

to help in any investigation that looked to the better condition of growing crops or of improving the land. He covered a wide range in those investigations and was sometimes criticized for matters that were not understood or seemed of small importance to ordinary interests. He was an excellent teacher and interested his pupils in the subject at hand, sometimes pretty dry, and did everything possible to give those matters a practical turn. His methods were clear and concise and he had little sympathy with slack work.

He was observant of current events and always spoke his mind freely in comment. He never "played to the galleries" but expressed his opinion of affairs as they appeared to him.

The Bussey Institution never had much money to carry on its work. Professor Storer was thus hampered by lack of funds and he was unfortunate in not having the faculty for getting help of this kind. He drew freely from his own funds, which could not have been over large, to help the school and the individual students.

In social intercourse he was never forward at all. His wife was a great help to him in this way, and they together did many kind acts to a newly appointed instructor at the Bussey Institution. On her death he drew into himself more than ever and had little intercourse in an every-day way with others.

Professor Storer's work is of the greatest importance in agricultural chemistry; in a way it is the foundation of modern agricultural chemistry. When he began, it was all new and he made the beginning.

ROBERT H. RICHARDS

BOSTON, MASS.

#### THE ANTWERP ZOOLOGICAL GARDEN

FROM the date of the bombardment of Antwerp, apprehension has been felt regarding the fate of the beautiful and costly zoological garden of that city. Messrs. Lorenz and Heinrich Hagenbeck, both of whom are yet in Hamburg, alive and well, have furnished the *Bulletin* of the Zoological Society of New York with a copy of a letter received by them from

Dr. Buttikofer, director of the Rotterdam Zoological Garden, which reads as follows:

All the bears in the Antwerp Zoological Garden were shot prior to the bombardment. The large feline carnivora were put into strong transportation cages and removed to the rear of the garden, likewise prior to the bombardment, while the small felinæ were transferred to cages in the cellars of the Festival Building. A few days before the surrender of the city, when the heavy cannonading started fires in all parts of the city, which could no longer be put out in consequence of lack of water, the large carnivora were likewise shot by resolution of the board of directors, *adopted contrary to the director's advice*. None of the other animals were killed, with the exception of a few venomous snakes. During the bombardment only one shell dropped into the garden, striking the ground in the open space for the turtles, where it fortunately did no material damage. Mr. L'hoest and his two younger children were my guests from October 5 to the earlier part of November, while the other members of his family likewise came to Rotterdam towards the end of the bombardment. Mr. L'hoest himself, whose mind had suffered severely from the effects of the terrible excitement and of the successive events which overpowered him, also came to Rotterdam for a few days, after the bombardment.

By the earlier part of November all the members of the family had returned to Antwerp.

The garden and the animals kept there have suffered no further damage during the siege, but you will readily understand that the number of visitors has so decreased as to be practically nil, while the membership will undoubtedly be reduced to such an extent that the very existence of the garden will apparently be put into serious jeopardy.

Everything here is in good shape, although there has likewise been a large decrease in our receipts, which compels us to be exceedingly economical. I presume that similar conditions prevail in all the zoological gardens in Germany, as well as in your country.

#### BENJAMIN PEIRCE INSTRUCTORSHIPS IN MATHEMATICS

THE Division of Mathematics in Harvard University announces that hereafter on or about the first day of March in each year it will recommend two persons for appointment to Benjamin Peirce Instructorships in accord-